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POLITICAL, SOCIOLOGICAL AND MILITARY AFFAIRS

(FOUO 8/81)

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CZECHOSLOVAKIA

DRAFTEE PHYSICAL CONDITION IN PRESOV OKRES EVALUATED

Prague CESKOSLOVENSKE ZDRAVOTNICTVI in Slovak No 3 , 1981 pp 102-109

[Article by M. Kriz, MD, District National Committee, Presov: "Physical Fitness of 18-Year Old Draftees in Presov Okres"]

[Text] Our socialist society offers unprecedented opportunities for a high standard of physical and mental health. Physical fitness of our population is one of the areas with a great potential for improvement of the quality of health. A systematic exogenous action on the genetic base of the organism may substantially affect the quality of health which, in the form of good physical fitness, may affect the rate of morbidity, disability and mortality due to cardiovascular diseases during the reproductive age, as well as improve the potential of the defense of our socialist achievements. Furthermore, it also may improve the administrative capacity of our leading officials and provide a genetic support for the condition of health of the future generations.

The beneficial effect of exertion on physical fitness was already known in ancient Greece; the English aristocracy, fearing degeneration and indolence, organized athletic and tennis clubs. Prof A. Wollenberger, a cardiologist of world renown, declared that regular daily exercise under submaximum stress practically prevents myocardial infarction. Academician Miasnikov says that the precondition for longevity is the development of the genetic base, namely, walking or jogging 10 km every day, maintaining one's body weight at the level of 22 years even at an advanced age, abstinence from smoking and avoidance of stress. In the opinion of Academician Amosov, if today's generation fails to change its lifestyle dramatically, it is to be expected that in some 30 or 40 years half of the population will be disabled and become a burden for the other half. Research conducted in certain areas of the world (Indian tribes in Mexico, South America, the population in the Swiss community of Blattendorf, where myocardial infarction has not been observed) indicates that motor activity is one of the extremely important factors in preventing the "diseases of civilization."

Motor activity is regarded as one of the factors responsible for higher ICHS. Lack of physical training leads to analogical changes as in predominance of the sympathetic nervous system. Raab observed a linear ascendant of the PR [pulse rate] and a decline in the isometric phase with declining physical training. Exercise induces sympathetic inhibition and increased elimination of catecholamines in the urine, thus changing the enzymatic relations of the heart. Correlations have been ascertained between physical inactivity and the incidence of

cardiac diseases and deaths. According to Schimert, physical exertion beneficially affects the body weight, reduces cholesteremia and lipemia; lowers blood pressure; improves cardiac action which becomes more economical due to a higher volume of the pulse and a lower PR. Prolonged and regular physical activity and exercise protect the heart from adrenergic vulnerability. From this it follows that motion affects the risk factors of cardiovascular diseases. However, this effect lasts only so long as the training continues! Physical fitness affects favorably also the thrombotic response, improves fibrinolysis, cardiac metabolism, PR, and collateral cardiac circulation; it affects enzymes, such as LDH and glucose-6-phosphate dehydrogenase, and hormones, such as insulin, the growth hormone, the steroids, thyroxine, and the androgens. Brief physical exertion connected with great strain has a more decisive effect!

Advancing automation results in muscular starvation, in higher demands on the CNS [central nervous system], in symptoms of illness caused by insufficient motor activity (hypokinesia--Raab). Its opposite is kinesophilia, the need to move. A certain degree of our inherited physical fitness (Grebe 1963) may be enhanced by systematic exercise, which may increase nonspecific resistance against environmental factors (Zimkin 1960). Resistance has a peak which may be reached but which fades rapidly if we fail to be consistent and systematic.

Under the concept of "fitness" we understand the ability of good physical performance in work and in personal life, and the optimum reaction to environmental stimuli. Physical fitness is a narrower concept which denotes creation of proper conditions for strenuous motor activity with regards to environmental factors. Performance, an even narrower concept, is the ability to execute a physical feat in a unit of time. It may be said that every citizen of our socialist society should try to improve his fitness. Motor sympathicotonia and the subsequent parasympathicotonia at rest may greatly enhance subjective feelings of health and expand the scope of adaptability to environmental factors and thus, a young person may very substantially affect his cardiovascular condition at a later age.

Method

We examined 75 young men born in 1961 who reside in Sabinov and Lipany (city youths) and 75 young men from more distant villages in the area of the territorial polyclinic in Sabinov, in the northern part of Presov Okres, who had presented themselves for conscription for basic military service. We obtained our material from the files of the District Military Administration in Presov. We do not disclose here the total number of the youths because of military secrecy. According to Fekete's scheme, our system is significant. At the first draft, 14 percent of the total number of the youths were found temporarily unfit for military service. From the rest we selected absolutely healthy individuals diagnosed as unaffected by any disease. We did not test any ophthalmological, orthopedic and other defects; our intention was to determine the physical condition of the above-mentioned youths. The objective of our study was to demonstrate that mortality, morbidity and disability may be basically influenced and thus, the economic factor improved by a lower rate of PNS and disability, and to demand better performance in the unit of time from individuals who are better fit physically. In addition to the physical examination, we also conducted a poll in the form of a questionnaire of the subjects, which appears in the tables. We tested physical

fitness by the W 170 method. Under the same conditions we induced graduated stress with weight equal to 1.5 and 2 W/kg. The subjects performed this work on a bicycle ergometer attached to one-leak EKG in the V 4 area and on manometer. The work is based on the following relation:

$$1W = \frac{\text{work}}{\text{time}} = 6 \text{ kpm/min} = \frac{\text{joule}}{\text{sec}}.$$

The enclosed scheme presents a record of the test (Graph 1) with current personal data, stress values in watt/kg of weight, values of the pulse at rest, blood pressure, values of fats from the tests of folds pursuant to Parizkova's method, the PWC index of 170/kg of weight, as well as the PR and the values of blood pressure after the stress and during recuperation. The duration of individual periods of stress was 4 minutes and the period of recuperation 5 minutes. In the graph we register the PR after the first stress period and six-fold value of stress in watts, i.e., kpm. We register the values after the second stress period in an analogical manner. By connecting the points thus obtained and by their extension we obtain a line on which we seek by extrapolation the value of PWC 170/kpm/min. In other words, we study how many kpm the subject can achieve at the pulse rate of 170, i.e., under submaximum stress. We derive a certain value in kpm which, divided by the weight of the subject, produces the PWC index 170/kg of weight, according to which we evaluate physical fitness. If we divide the amount of kpm at PR 170 by 6, we obtain the value of work expressed in watts which the subject performed at the pulse rate of 170. By dividing this value by his weight, we obtain a value which indicates how many watts the subject performs at the PR of 170 of his weight. On the basis of this weight, we assess his physical fitness.

Table 1. PR at Rest, after Stress and in Recuperation

Pulse Rate	City Youths		Country Youths	
	No	Percent of 75	No	Percent of 75
Values of Pulse at Rest				
Under 60 PR/min	3	4	3	4
60-80 PR/min	24	32	23	30.7
81-100 PR/min	36	48	40	53.3
over 100 PR/min	12	16	9	12
PR Values after 1.5 W/kg of Weight				
Under 130 PR/min	25	33.3	26	34.7
131-140 PR/min	22	29.4	22	29.4
141-150 PR/min	14	18.6	14	18.6
151-160 PR/min	8	10.7	11	14.6
over 160 PR/min	6	8.0	2	2.7
PR Values after 2 W/kg of Weight				
Under 150 PR/min	21	28	26	34.7
151-160 PR/min	24	32	12	16.0
161-170 PR/min	9	12	23	30.6
over 170 PR/min	21	28	14	18.7
Values PR after 5-Minute Recuperation				
PR 0-20 percent	40	53.3	48	64
over 20 percent	35	46.7	27	36

Results

Table 1 represents the value of pulse rate, at rest, after the first and after the second stress period, and during recuperation. According to Raab, the better the training, the lower the PR at rest. After stress, the heart of a trained individual reacts by raising the pulse volume to the detriment of the heart rate. The heart reacts to stress by raising the PR because the volume of pulsation rises only slightly from the norm of 60 ml in untrained individuals and up to 120 ml in trained individuals. When the value of the volume of pulsation in a trained individual is exhausted, the heart increases its rate. Good indicators of bradycardia at rest were observed in three of the city subjects and in three of the country youths, which is 4 percent of the system. All of them were active athletes (in various types of sports), with the exception of one 18-year old country youth who, however, was working in construction assembly, earning Kcs 4,000; thus, it may be presumed that this individual performed extremely strenuous physical work. Values of PR at rest within the norm were observed in one-third of the tested individuals; 64 percent of the city and 65.3 percent of the country youths demonstrated higher values of PR at rest. Table 4 presents median values of the PR at rest, which amount to 85.9/min in the city youths, and to 84.9/min in country youths, i.e., a value higher than our norm. After the first stress period 1.5 W/kg of weight we regard as a good indicator one that does not exceed PR over 130/min. Roughly one-third of our subjects appeared within the range of that "norm." Adverse PR values over 150/min were demonstrated in 14 city and 13 country youths. The mean PR value after an exercise load of 1.5 W/kg is 138.1/min for city youth and 135.6 for country youth, as indicated in Table 4. A good PR of under 150/min after a second exercise was achieved by 28 percent city and 34.7 percent of country boys. Some 28 percent of city and almost 19 percent of country boys have very unsatisfactory PR of over 170/min. Mean values in Table 4 are 158.6 heart beats for city and 157.6 beats for country boys. Mean PR after the first and after the second exercise load show slightly increased PR to above 130 and 150/min [respectively for city and country boys]. Good adaptability of the heart muscle to adjust to rest would be reflected in a PR no higher than 20 percent of the at-rest value after a 5 minute recuperation. However, we must take into consideration relatively high at-rest PR values. Some 53.3 percent of city boys and 64 percent of country boys fit into correct category. Mean PR for recuperated boys in Table 4 is 105/min with upper limit of 20 percent is 102/min, for country boys 102.5 (101 min). It can be seen from this, that the recuperation of the heart muscle is just above the acceptable limit of 20 percent of the at-rest PR. The better trained the individual, the closer is his PR to the at-rest condition.

Table 2 presents the values of blood pressure [BP] after stress of 1.5 and 2 W/kg. Values at rest are within the norm partly because this test dealt with subjects unaffected by any morbid changes. The values of blood pressure elevated by 10 torr at 30 kpm are within the norm. If we take the median value of weight from Table 4, the result is average stress of 100 W, i.e., 600 kpm in the first stress period; thus, the values of BP up to 150 mm Hg (less than 20 kPa) are within the norm. These values were obtained in 24 percent of the city, and in 37.3 percent of the country 18-year old youths. Analogically, in the second stress period the values under 170 mm Hg (less than 22.66 kPa) were within the norm. This value was obtained in 24 percent of the youths in both groups; relatively high values over

Table 2. Values of the Blood Pressure System Under Stress

Blood Pressure Values	City Youths Number	City Youths Percent of 75	Country Youths Number	Country Youths Percent of 75
Blood pressure after stress of 1.5 W/kg of weight				
Under 150 torr				
> 20 kPa	18	24.0	28	37.3
150-170 torr				
20 kPa - 22.66 kPa	49	65.3	40	53.3
Over 170 torr				
< 22.66 kPa	8	10.7	7	9.4
Blood pressure after stress of 2 W/kg of weight				
Under 170 torr				
> 22.66 kPa	18	24	18	24
170-190 torr				
22.66 kPa - 25.33 kPa	47	62.7	46	61.4
Over 190 torr				
< 25.33 kPa	10	13.3	11	14.6

Table 3. Rating of Physical Fitness in Wg and kpm/kg/min of Weight

Physical Fitness	Index	City Youths No	City Youths Percent of 75	Country Youths No	Country Youths Percent of 75
PWC 170 kpm/kg/min					
Excellent	≥ 20	3	4.0	2	2.7
Above average	18.0-19.9	4	5.3	3	4.0
Average	16.0-17.9	9	12.0	9	12.0
Below average	14.0-15.9	19	25.4	18	24.0
Insufficient	≤ 13.9	40	53.3	43	57.3
Work in W 170/kg of weight					
Excellent	> 3.33	3	4.0	2	2.7
Above average	3.00-3.22	4	5.3	3	4.0
Average	2.66-2.99	9	12.0	9	12.0
Below average	2.34-2.65	19	25.4	18	24.0
Insufficient	≤ 2.33	40	53.3	43	57.3

190 mm Hg (more than 25.33 kPa) were reached by 14 percent in both groups. Table 4 presents median BP values after the first stress period, which are 156.3 and 155.0 mm Hg, respectively, and after the second stress period, namely, 178 mm Hg and 175.9 mm Hg, respectively; these values are higher than the norm of 150 to 170 mm Hg. After 5 minutes of recuperation all subjects demonstrated the same BP values as at rest.

Table 4. Median Values of Indicators and Their Comparison

Value	City Youths	Country Youths
PR at rest	85.90/min	84.9/min
PR after 1.5 W/kg	138.1/min	135.6/min
PR after 2 W/kg	158.6/min	157.6/min
PR after 5-minute recuperation	105.0/min	102.5/min
W 170/kg	2.36 W/kg	2.36 W/kg
PWC 170 Kpm/kg/min	14.23	14.11
PR after 1.5 W/kg	156.3 torr. syst. PR	155.0 torr. syst. PR
PR after 2 W/kg	178.0 torr. syst. PR	175.9 torr. syst. PR
Percent of fat in weight	11.72 percent	12.58 percent
Average height - weight	174.8 cm - 66.99 kg	173.2 cm - 68.43 kg

Table 3 reviews the functional fitness of the subjects. As mentioned above, the amount of the kpm value at PR 170 was theoretically determined by extrapolation, and divided by the weight of the subject; its result is index PWC 170 kpm/kg/min. According to this index we rate physical fitness as excellent if the index is above 20, from 18.0-19.9 as above average, from 16.0-17.9 as average, from 14-15.9 as below average, and under 13.9 as insufficient. From the table it appears that physical fitness of 4 percent of the city youths (3 individuals) and of 2.7 percent of the country youths (2 individuals) qualified as excellent; 5.3 percent (4) city youths and 4.0 percent (3) country youths were above average; 12 percent (9) of the city youths and the same number of the country youths were average. If we take average physical fitness as the norm, then 21.3 percent (16) of the city, and 18.7 percent (14) of the country youths are in the range of the PWC index of 170 kpm/kg/min. In the range below average and insufficient physical fitness are 59 city and 61 country youths. The median value of the index in Table 4 is 14.23 in the city, and 14.11 in the country youths; thus, in both groups it appears on the lower level of the index for below-average physical fitness. We obtain the same results if we divide the kpm by 6; the results denotes the amount of stress executed by the subject at PR 170. If we divide this number by his weight, we obtain the value in W/kg. According to this value, the individual who deals with more than 3.33 W/kg of his weight at PR 170/min is physically fit; the range from 3.0-3.32 is above average, from 2.66-2.99 W/kg of weight is average, from 2.34-2.65 is below average. Below 2.33 physical fitness is insufficient. The average value is 2.36 W/kg of weight, and as in the preceding table, it appears on the lower level of the below-average physical fitness.

Table 5. Questionnaire of the Subjects, and Values of Fat

Question	City Youths	Country Youths
Smoking		
Nonsmoker	48	39
Smoker	27	36
Alcohol		
Abstinent	20	10
Drinker	55	65

[Table continued on following page]

Question	City Youths	Country Youths
Swimming		
Swimmer	60	51
Nonswimmer	15	24
Sexuality		
0	41	35
1 woman	23	32
2 and more	11	8
Body fat according to Parizkova		
under 9 percent of weight	9	8
9-11 percent	31	20
over 11 percent	35	47

The answers of the subjects in the questionnaire were strictly confidential. From Table 5 it appears that 48 city, and 39 country youths did not smoke. High values in alcohol consumption amount to 55 city, and 65 country youths. One may speak only of the second degree of alcoholism, since the subjects only recently reached their 18th birthday and became legally able to consume alcoholic beverages. Among the city youths, 20 percent were nonswimmers, as were slightly over 30 percent of the country youths. Interesting is their sexuality: 34 city, and 40 country youths admitted intercourse with the opposite sex. In our test we determined fat by measuring skin folds with a caliper according to Parizkova's method. Although Parizkova established up to 14 percent of the body weight as a norm for the middle-age generation, in our opinion the values of fat in 18-year old youths must be rated according to criteria for athletes. Fat as ICHS risk factor was determined in 35 city, and 47 country youths as above the norm of 11 percent. Table 4 presents the median value of height and weight of 174.8 cm and 66.99 kg in the city, and 173.2 cm and 68.43 kg in the country youths. The median value of fat is 11.72 percent of the body weight for the 75 city youths, and 12.5 percent for the country youths, in other words, these values are well below norm. From other questions which are not included in Table 5 it appears that a small number of the youths regularly compete in sports; not a single subject walked at least 5 km daily. In most cases they walk from their home to the bus station. A very small number of subjects attended concerts and theater, however, every month they visited taverns frequently.

Conclusion

It is not our intention to imply that in general, physical fitness of the 18-year old generation is below average. We are able to say this with assurance only with regards to a group of 18-year old youths in the northern part of Presov Okres within the range of the polyclinic in Sabinov, who were born in 1961 and subject to draft for military service. In view of the results obtained we concluded that this test should be repeated with future classes of 18-year old youths in other okreses of Slovakia. If such results prove to be a rule, then it is imperative to begin as early as in nursery schools with the prevention of the diseases of civilization. The physical fitness of our population may be improved if every individual and every ministry cooperate (for example, education; construction--creation of health zones; competitions--short daily programs of physical fitness; environmental protection; public health). As health workers, we should adopt the words of P. White who in his lecture in Burlington in 1964, "To Practice What We Preach," spoke about

prevention of cardiovascular diseases and appealed to physicians to set an example for others by their own lifestyle. Our socialist society offers us such opportunities. Here we see one of such opportunities to cut morbidity, disability and mortality caused by cardiovascular diseases.

Summary

The author tested physical fitness in a significant group of 18-year old youths from an area in Presov Okres using Fekete's program, the W 170 method, as well as a confidential questionnaire. From the report presented here it appears that the tested group needs to improve considerably the physical potential of the body. If this indicator should prove to be the rule, then physical fitness must be upgraded with the cooperation of all interested parties by a program for improving the condition of our population's health.

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